REMARKS

This paper is intended as a full and complete response to the Final Office Action dated October 10, 2006. If the Examiner does not agree with the comments herein, the Applicant kindly requests that the Examiner promptly send an Advisory Notice so the Applicant can proceed with application prosecution options.

Claims 50-51 are currently amended.

Claims 1, 3-6, 8-14, 16-34, 50-62, and 64-65 are before the Examiner.

Claims 1, 6, 7, 50, and 51 were rejected as anticipated by *Harrison*; Claims 1, 3, 5-6, 8-14, 16, 25-27, 33-34, and 50 stand rejected as anticipated by *WO 2004/068014* (*WO '014*); Claim 3 stands rejected as obvious in view of *Harrison* and *Luppi*; Claim 4 stands rejected as obvious in view of *WO '014* and *Moses*; claims 8, 9, 17-24, 28-32, 51-58, 60-62, and 64-65 stand rejected as obvious in view of *Harrison* and *Moses*; and claim 59 stands rejected as obvious in view of *Harrison, Moses*, and *Luppi*. Further examination of the application, as amended, and reconsideration of the rejections are respectfully requested.

By way of background, Applicant's invention provides methods and apparatus to traverse a subsea topographic feature with a subsea pipeline including at least one *distributed* buoyancy region. Distributed buoyancy is discussed in the specification at paragraph [0008], for example.

Support for "device" in amended Claim 50 can be found in the first sentence of paragraph [0052]. Support for "flexible" in amended Claim 50 can be found in the fourth sentence of paragraph [0033]. Support for freely suspended in amended Claim 51 is

provided by the term inverse catenary. For example in Claim 50 and paragraph [0030]. Catenary is the curve assumed by a perfectly flexible inextensible cord of uniform density and cross section *hanging freely* from two fixed points, and an inverse catenary would form where the cord is *suspended freely* and the density of the cord is less than the ambient fluid medium, i.e. the cord is buoyant. Claim 51 is further amended to depend from claim 50. Applicant believes that no new matter has been added with these amendments.

Claim Rejections - 35 U.S.C. §§102-103

Harrison does not teach a distributed buoyancy region, rather *Harrison* teaches in a single buoy (as illustrated in *Harrison* Figure 4) which is sharp contrast to a distributed buoyancy region. As previously noted in responses, a single buoy cannot be said to anticipate the distributed buoyancy region recited in Claims 1, 50, and 58. The art clearly recognizes that single concentrated buoyancy devices are distinct from distributed buoyancy devices. (See, commonly assigned U.S. Patent 7,025,533 to Mungall et al. for "*Concentrated* Buoyancy Subsea Pipeline Apparatus and Method")

The Federal Circuit has held "the words of the claim must be given their plain meaning unless the plain meaning is inconsistent with the specification." *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 75 USPQ2d 1321, 1326 (Fed. Cir. 2005) (en banc). See also MPEP §2111.01.

The ordinary and customary meaning of a term may be evidenced by a variety of sources, including "the words of the claims themselves, the remainder of the specification, the prosecution history, and *extrinsic evidence* concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Phillips v. AWH Corp.*, 415 F.3d at 1314, 75 USPQ2d at 1327 (emphasis supplied).

One skilled in the art readily appreciates that a single attachment point for a lone buoy is a concentrated buoyancy device and does not equate to a distributed buoyancy region. The differing meanings of concentrated buoyancy and distributed buoyancy to a person of ordinary skill in the art are further readily apparent from, for example, the four references submitted herewith that refer to distributed buoyancy in reference to a riser.

The American Petroleum Institute's (API) Recommended Practice for Flexible Pipe publication provides relevant definitions for a buoyancy module and a subsea buoy, which illustrate the ordinary meaning of distributed and concentrated buoyancy. (Excerpt of *API Recommended Practice 17B*, Third Edition, March 2002 included as Attachment A). A buoyancy module is defined as a "buoy used in significant numbers at discrete points over a section of riser to achieve wave shape riser configurations (see API section 4.4.6)." A subsea buoy is defined as a "*concentrated* buoyancy system, generally consisting of steel or syntactic foam tanks, as used in S-type riser configurations (see API section 4.4.5)." As a single discrete point of buoyancy, i.e., subsea buoy, is considered concentrated buoyancy, it follows that buoyancy distributed over discrete points is considered distributed buoyancy. Differing shapes achieved with distributed (wave-shaped) and concentrated (S-shaped) buoyancy can be seen in reference to enclosed Figure 4 of the reference.

API section 4.4.5 discusses subsea buoys and API section 4.4.6 discusses buoyancy modules. A reading of theses sections indicates that a single *discrete* attachment point for a lone buoy, for example, the gutter/arch of a subsea buoy, is understood as a concentrated buoyancy device, and not considered the equivalent to buoyancy at *a number* of discrete points, for example, a plurality of buoyancy modules, which is understood as distributed buoyancy.

The Rigzone.com reference (included herein as Attachment B), available at http://www.rigzone.com/news/insight/insight.asp?i_id=80, discusses Flotation Technologies, a manufacturer of deepwater buoyancy systems, unveiling a *distributed* buoyancy module. The Rigzone.com reference notes "distributed buoyancy is used on flexible flowlines, umbilicals and steel catenary risers to hold subsea lines in a configured shape. These configurations allow the floating production facility free range of motion at the surface without putting undue stress on the subsurface lines." When compared to concentrated buoyancy, distributed buoyancy can allow for lower stresses due to the ability to hold a configured shape as the buoyancy is not at a *single point*. The Rigzone.com reference describes the use on a pipe riser between the seabed and a floating production facility and thus illustrates one skilled in the art does not consider the region of the line secured to a single buoy to be a *distributed* buoyancy region, as the office action alleges.

The Flotec.com reference (included herein as Attachment C), available at http://www.flotec.com/flo31.html, is an advertisement for the "distributed buoyancy modules" of the second article. The Flotec.com reference also notes that distributed buoyancy is "used to maintain a pre-defined configuration of subsea flexible risers and

umbilicals (such as lazy, steep or pliant waves)."

The Offshore Technology Conference paper (OTC 8523) for a hybrid pipe riser system (included herein as Attachment D). On page 3 of the paper, the article notes that *distributing* the buoyancy along the riser, instead of concentrating the buoyancy, e.g., by tethering an air can to the upper end of the riser, results in an even tension along the entire riser length:

> Analysis shows that this is efficient, requiring less total buoyancy than an arrangement using near surface air cans due to the higher hydrodynamic loading in the case of the latter. The higher tension in the air can arrangement and intrinsically stiffer upper section results in higher base loads as deflections are concentrated near the base of the riser rather than evenly distributed along the riser length. This results in the need for a high specification taper joint, and foundations. Furthermore, the high upper riser tension and stiffness results in lower compliancy.

As shown by the references above, the forces, and consequentially the stresses and compliancy of the pipe, imparted by concentrated buoyancy (for example, a near surface air can assembly) are different from those forces imparted by a region of distributed buoyancy: distributed buoyancy is not the equivalent of concentrated buoyancy as asserted in the office action.

Both the extrinsic evidence and the plain meaning of the terms indicate one skilled in the art would not equate distributed and concentrated buoyancy, and accordingly, the distributed buoyancy region in the claims is not anticipated by the concentrated buoyancy device in the references cited in the final office action.

The portion or region of the pipeline which is temporarily vertically deflected in *Harrison* is supported at a discrete point by a *single* buoy, and does not comprise a distributed buoyancy region. A *portion or region* of the pipe is not itself buoyant as

alleged by the office action, but merely *supported* by a single point of concentrated buoyancy (e.g., the buoy secured at a single attachment point), as evidenced by the shape of the pipeline 10 in Figure 4.

Amended claim 50 further clarifies that the buoyancy of the distributed buoyancy region, by specifying a "distributed buoyancy *device* region," is attributable to distributed-type buoyancy *devices*, as understood in the pertinent art. Clearly, the abstract idea of distribution of a single point of buoyancy, from a single concentrated buoyancy device through a region of the pipeline as alleged in the office action, is not encompassed by the claims in general and Claim 50, as amended, in particular.

Moreover, with respect to independent Claim 50, the office action alleges that Figure 4 of Harrison shows an inverse catenary, however the negatively buoyant pipe in *Harrison* assumes the shape of either regular downward catenaries on either side of the buoy attachment, or arcs as defined by the stiffness of the pipe to resist collapsing or crimping at the single concentrated buoyancy device attachment. A catenary is of course understood by its ordinary dictionary definition as being similar to the form of a curve assumed by a perfectly flexible inextensible cord of uniform density and cross section hanging freely from two fixed points, and an inverse catenary would form where the density of the cord is less than the ambient fluid medium, i.e. the cord is buoyant.

WO '014 discloses an underwater bridge to support a pipeline. *WO '014* fails to disclose a distributed buoyancy region *of a pipeline* as recited in Applicant's claims. Element 6 is a bridging duct section and includes frame 25 for supporting a pipeline over a basin (See *WO '014* 3/33-4/2 and *WO '014* Figure 1). *Frame 25 can include buoyancy members*, but the buoyancy in *WO '014* is not imparted to the pipeline per se which

remains negatively buoyant and rests or is supported on the frame. *WO '014* is a complicated frame and truss pipe support system applicant seeks to avoid for spanning a scarp by suspending the flexible pipe using distributed buoyancy.

In reference to Claim 3, the Office Action alleges that applicant previously submitted that *WO '014* does not show a plurality of buoyancy modules, however applicant stated in the previous office action that *WO '014* does not disclose any "plurality of discrete buoyancy-providing modules distributed along a length *of said pipeline*," as recited in the claims. The buoyancy members are distributed along the frame and not the pipeline which is prevented by the frame from flexing in *WO '014* (See *WO '014* 4/1-2).

As to Claim 27, Applicant contends that at best any buoyancy members added to the frame 25 are disclosed as providing *neutral* buoyancy (see 4/1-2), which is not *positively* buoyant as required in the claim. As to Claim 50, neither Figure 3 nor Figure 4 of *WO '014* discloses a flexible inverse catenary section of pipeline, but only a linearly extending pipeline and an articulated joint 7. The structure taught in every embodiment of *WO '014* teaches away from having an inverse catenary section, at 3/30 noting the "*bending* and buckling of the duct section 6 is *prevented*." Amended Claim 51 further clarifies that the distributed buoyancy device region is *freely* suspended, whereas the pipeline in *WO '014* is constrained inflexibly by the frame.

Luppi fails to bridge the gap from *Harrison* to Applicant's Claim 3. *Luppi* discloses a flexible riser system having a single buoy 5 with multiple cylinders (22-24) therein. The compartmentalization of a *single* buoy 5 cannot be said to teach or suggest a *plurality* of discrete buoyancy modules distributed *over a length* of said pipeline.

Moses et al. fails to bridge the gap from *WO '014* to Applicant's claims. Applicant's Claims 4 and 60 recite the limitation that the "*distributed* buoyancy region comprises a continuous coating of buoyant material". Element 62 in Figure 5 and Figure 6 of *Moses* is specifically referred to as a *single* concentrated buoyancy element, for example at 6/62, and thus is not a *distributed* buoyancy region as the terminology is understood by the skilled artisan. Even if somehow the single concentrated buoyancy element 62 of *Moses* were attached to the frame of *WO '014* as the office action submits, what results is not a distributed buoyancy region of a pipeline, merely a buoyant bridge.

Moses fails to bridge the gap from *Harrison* to Applicant's Claims 8, 9, 17-24, 28-32, 51-58, 60, 61, and 62-65. *Moses et al.* teaches a riser system and at least one end of the riser by definition does not extend to the sea floor, failing to meet the affirmatively recited requirement of Claims 1, 50, and 58 that *both* sections of pipeline extend from the sea floor. The references, alone or in combination, do not disclose traversing a topographic feature with a *distributed* buoyancy pipeline region between sections of the pipeline, on either side of the buoyant region, that lie on the sea floor.

The office action alleges that element 18 of *Harrison* is a flexure control device, however element 18 is a weighted mass used to sink the pipeline or a length compensating joint which can extend or retract axially; neither of which can be said to be a "flexure control device" as no flexure control is achieved (See *Harrison* 3/57-4/6 and 6/48-68, respectively).

The Office Action alleges without evidentiary support that one skilled in the art would have found it obvious to substitute one type of buoyancy member for another. Applicant respectfully traverses this rejection and notes that the considerations are

different in each of the references, and the results are also different, and hence the manners of application are markedly different. For example, see the API publication. Applicant respectfully requests credible evidence be made of record under 37 C.F.R. 1.104(d)(2) or otherwise that one skilled in the art would be motivated to substitute the different types of buoyancy members as alleged.

As to Claim 60, neither *Moses* nor *Harrison* teach or suggest a distributed buoyancy region, much less one that comprises a continuous coating of buoyant material. *Harrison* and *Moses et al.* disclose at best a single buoy. *Moses* at 6/62 teaches element 62 in Figure 5 and Figure 6 is a "*single* buoyancy element" that attaches at a single point 57 of the vertical riser and thus is not a *distributed* buoyancy region, but a lone buoy similar to the one taught in *Harrison.*

Luppi similarly fails to bridge the gap from *Harrison* and *Moses et al* to Applicant's Claim 59 for the reasons discussed above. None of the references alone or in combination teach or suggest a plurality of discrete buoyancy modules distributed over a length of said pipeline to form a distributed buoyancy region as claimed.

Further examination of the application is respectfully requested. In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. If any issues remain that are appropriate for resolution by telephone interview, please contact undersigned counsel.

Applicant thanks the Examiner for his time on the matter.

Respectfully submitted,

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Attachments: A -- API Recommended Practice excerpts
B -- Rigzone.com article
C -- Flotec.com article
D -- OTC 8523 paper